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ATTITUDES OF HIGH SCHOOL STUDENTS AS RELATED TO SUCCESS IN SCHOOL.

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THE PURPOSE OF THIS STUDY WAS TO CLARIFY UNDERSTANDING OF SPECIALIZATION OF INTERESTS AND ATTITUDES OF HIGH SCHOOL STUDENTS AND THE RELATION OF THESE MENTAL CONSTRUCTS TO ACADEMIC ACHIEVEMENT. THE MAJOR OBJECTIVES WERE TO DEFINE ATTITUDES WHICH LEAD TO INTRINSIC INTEREST IN SUBJECT-MATTER CONTENT, AND TO DEVELOP AN INSTRUMENT FOR SCALING THE DEFINED ATTITUDES. ITEM ANALYSIS AND SELECTION WERE BASED ON SAMPLES OF 92 HIGH SCHOOL SCIENCE STUDENTS, WITH FOLLOWUP QUESTIONNAIRES TO 325 HIGH SCHOOL SCIENCE STUDENTS ENROLLED IN A COLLEGE PREPARATORY COURSE, AND A FINAL SAMPLING OF 3,750 STUDENTS IN THE SAN FRANCISCO BAY AREA. INVESTIGATIONS WERE MADE OF (1) THE ASSOCIATIONS BETWEEN ATTITUDINAL VARIABLES, RELATIVE ACHIEVEMENT IN VARIOUS SCHOOL SUBJECTS, AND VOCATIONAL AND EDUCATIONAL ASPIRATIONS OF HIGH SCHOOL STUDENTS, AND (2) PARTIAL ASSOCIATIONS WITH VARIABLES IN SUBGROUPS, HOMOGENEOUS WITH RESPECT TO AGE, SEX, SOCIOECONOMIC STATUS OF PARENTS, AND IQ. A LICKERT-TYPE ATTITUDE INVENTORY, STRUCTURED QUESTIONNAIRE, NONDIRECTIVE INTERVIEW, AND EXTANT RECORDS WERE USED TO COLLECT DATA. FOUR EXTREMES OF DECISION-MAKING WERE USED AS END POINTS OF THE ATTITUDE SCALES. CONCLUSIONS INDICATE A DIRECT RELATION BETWEEN ATTITUDE TYPES, SUBJECT INTERESTS, GRADES, AND VOCATIONAL ASPIRATIONS. (GC)

ATTITUDES OF HIGH SCHOOL STUDENTS
AS RELATED TO
SUCCESS IN SCHOOL

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FOREWORD

During the past two years, Alan Wilson and I have been engaged in research concerning the attitudes of high school students and the study of school subjects. We were led into this field because we both felt that in order to improve the quality of science education it is important to identify and attract students with potential gifts in this area. Research into the attitudes favorable to success, and into how these attitudes may be identified and modified is a responsibility for educators and a clear need for our society.

Once started, we found ourselves reviewing the entire field of attitudes as related to academic studies generally; in order to measure the strength of attitudes favorable to the study of science we were forced to compare these attitudes with those favorable to the study of the humanities on the one hand, and with those conducive to a life of blissful ignorance on the other.

We think we have made some progress.

T. B. E.
A. B. W.

UNIVERSITY OF CALIFORNIA
Department of Education

Final Report - July 31, 1958

IDENTIFICATION

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Department of Education.
- b. Name of Project Director: T. Bentley Edwards, Associate Professor
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of Field Service.

Associate Director: Alan B. Wilson.
- c. Title of the Project: ATTITUDES OF HIGH SCHOOL STUDENTS AS RELATED
TO SUCCESS IN SCHOOL.
- d. Period Covered by the Report: August 1, 1957 to July 31, 1958.

INTRODUCTION

Conceptualization of the theoretical framework, selection of items for an inventory of six attitudinal scales, and administration of the inventory to a pilot group took place before August 1, 1957. Brief descriptions of the theory, of the selection of items, and of the sample of students included in the pilot group, necessary if the report on the research performed under the contract with the Office of Education is to be understood, will be included.

The main body of the report will, of course, deal with those aspects of the investigation which were carried out during the contract period.

At the outset, the responses of the group of students constituting the pilot study were analyzed along the lines suggested by Guttman,

Stouffer, and others, and these responses, on a six point scale were dichotomized. The replies were further consolidated by the formation of compound items. As a result, development of the six scales, each composed of three compound items, was possible and a description of this development will be provided. The information obtained from this sample of students, other than their responses to the attitude scales, was used to validate the scales and to show how certain interrelationships were established to confirm or refute a priori hypotheses and to explore the relations between values, achievements, etc., for further insight. As listed in the plan and as referred to a number of times in the progress reports, the next step was the administration of the tested inventory to a large sample. Because of developments in the progress of this large scale investigation, sampling procedures were modified over a period of time and will be described. With the information from the large sample, the scales have been reestablished and attempts have been made to replicate the additional findings referred to earlier.

THEORETICAL ORIENTATION

An article entitled "Attitudes toward the Study of School Subjects" written by the directors of the project was published in Educational Theory.¹ Reprints of this article were forwarded earlier to the Office of Education. This statement will be summarized at the present time.

The article referred to makes clear the purpose of the study, which is to clarify our understandings of the motivation of high school students. The concept of motivation is not particularly useful because of the fact that diverse meanings are attached to the term by people using different

¹ T. Bentley Edwards and Alan B. Wilson. "Attitudes toward the study of School subjects," Educational Theory, Vol. VIII, No. 4, October, 1958. pp. 275-284.

theoretical orientations to understand behavior. A switch was made, therefore, to the concept of attitudes because of the sharper definition of this term which has been achieved by Guttman, Stouffer, Lazarsfeld, and others. Following these writers, the term "Attitudes" will be reserved for the feelings demonstrated overtly by respondents as they make the designated indications on a pencil and paper inventory. The idea stressed by Louis Guttman,² of the importance of inventory responses as discrete and manageable overt behavior does much to ease the difficulty encountered with attempts to validate attitude scales by means of external criteria. According to Guttman's theory, scales are tested only for internal consistency. By this means the entire question of validity is restored to its place as a responsibility of the one who is reading the items and using his understanding of these items to enrich his knowledge of the relationship demonstrated between objectively measured dimensions. When the relationships between scores on attitude scales and academic success have been determined, and when scores have been related to commitments to specialization in the natural sciences, on the one hand, and social and literary studies, on the other, information is available for improved screening processes for the selection and training of the so-called "gifted" child.

Before writing items suitable for the measurement of attitudes it was necessary to develop a schema for the establishment of end points suitable for the production of scales. The basic concept of this schema is that there is a variation in the tolerance for deliberation in individual

¹ Studies in Social Psychology in World War II, Vol. IV, Measurement and Prediction, ed. by Samuel A. Stouffer (Princeton: Princeton University Press, 1950), p. 86.

strategies for decision-making. Deliberation is a suspension of decision, while a variety of possible associations are mentally or experientially projected. Some individuals use the most proximate clues or associations as a basis for decision-making. There is an impulsion toward action, and action as a result of such limited thinking may lead to unanticipated consequences. Extreme intolerance for deliberation implies following the clues provided in the immediately given context. Thus, the first dimension of attitudes employed here to conceptualize attitudes to the study of school subjects goes from the deliberative to the non-deliberative. A second dimension is postulated, going from the social to the non-social. These two cross-cutting dimensions provide four vectors by means of which orientations of personality may be assessed: the deliberative orientation toward the social environment, characterized by an analytical approach to society; the deliberative approach toward the non-social environment, characterized by interest in natural science; the non-deliberative orientation toward the social environment, characterized by dependence upon esteem and sanctions of others; and the non-deliberative orientation toward the non-social environment, characterized by an affective appreciation of things. The vector which serves as a focus for those attitudes which are favorable toward reflection upon alternative possibilities of social action, will be called "Prudent." The vector which focuses attention upon aptitudes which are favorable toward deliberation with respect to the natural environment, will be called "Theoretic." The constellation of attitudes which go along with an immediate response to the social environment will be called "Immediate," and the fourth pole, an immediate reaction toward the non-social environment, will be called "Aesthetic." These four poles designated by the terms Prudent, Theoretic,

Immediate, and Aesthetic, provide the end points of six scales. The scales appear when each of the four poles is contrasted with the remaining three, Prudent-Theoretic, Prudent-Immediate, Prudent-Aesthetic, Theoretic-Immediate, Theoretic-Aesthetic, Aesthetic-Immediate. An assumption is made that the six continua represented by the reversal of the six just mentioned, provide no new concepts. Theoretic-Prudent is assumed to be the obverse of Prudent-Theoretic. While any choice of behavior an individual might make could be categorized according to this conceptual scheme, it is not suggested that these dimensions are necessarily the most relevant in accounting for all behavior. Any historical event is far too complex for a single theory to reproduce it. These dimensions, however, seem to be particularly relevant to an understanding of attitudes towards school subjects. The justification for the schematization of behavior provided must be pragmatic.

PRELIMINARY STUDY

A large number of short propositions expressing preference for one of two alternatives were written. The content for each alternative was designed to represent one pole of one continuum and was paired in the proposition with an alternative relatively approximating the opposite pole. From this fund of propositions thirty were selected for each of the six scales, making 180 items in all. The following criteria governed the editing and selecting of items:

1. Theoretical relevance of content;
2. Clarity of meaning;
3. Appropriateness of vocabulary and content for high school students;
4. Balance of proportion of positive viz negative items;

5. Avoidance of dyslogistic phraseology or alternatives counter to cultural universals;
6. Avoidance of factual items, responses to which might not reflect attitudes.

The mimeographed Inventory of Choices was administered to two groups of individuals: ninety-two high school students in a required biology course, composed of four sections roughly stratified by the schools according to IQs and prior achievements; and fifty undergraduate university students in two sections of an education course. Responses were indicated on a Likert-type six-point forcing scale: "Strongly agree," "moderately agree," "slightly agree," "slightly disagree," "moderately disagree," and "strongly disagree." Following Louis Guttman's Cornell technique, twelve tables were laid out, one for each scale for each of the two samples, separately. Each table was constructed with one column for each of the six response categories for each item, and one row for each individual in the sample. Thus, since each scale had thirty items, and each item contained six response categories, each table consisted of 180 columns, and as many rows as individuals in the sample. The individuals were ordered high to low for each scale, according to their summated scores and listed vertically down the left side of each table. The responses of each individual to each item were indicated by x's in the appropriate cells, the resulting tables, containing all of the data gathered.

Twelve items were selected from the thirty of each scale on the basis of the following criteria:

1. The level of discrimination in the high school group;
2. Reliability of the discrimination indicated by the replication with the university group;

3. Variation in the distribution of item marginal totals, indicating the "popularity" of positive responses, in order to provide several "cutting points" in the continua.

The twelve selected items from each of the six scales were then again randomized to construct a revised inventory of choices, composed of 72 items.

With a perfectly cumulative, uni-dimensional scale, persons who answer a given question favorably, all have higher ranks on the scale than persons who answer the same question unfavorably. Construction of perfect scales of this kind are rarely, if ever, possible. All of them contain so-called "errors." These errors may rise from idiosyncratic interpretations due to the complexity of the statement. Occasionally the respondent's decision is based on the factors specific to each item, not necessarily on the factor common to all the items of the scale.

Cancellation of specific factors can be enhanced, and an approximately cumulative scale constructed, by grouping equivalently popular items and defining positive responses to a majority of each group of items as a positive response to the compound item. This is the so-called "H-technique" of Samuel A. Stouffer.³ This device reduces the number of errors, thus enhancing the possibility of reproducing scores from ranks and vice versa, but it also reduces the number of possible ranks to which an individual may be assigned. In a sense, the technique helps the investigator use an instrument within its powers of resolution.

³ Samuel A. Stouffer, Edgar F. Borgatta, David G. Hays, and Andrew F. Henry, "A Technique for Improving Cumulative scales," Sociological Studies in Scale Analysis, ed. by Matilda White Riley, John W. Riley, Jr., and Jackson Toby (New Brunswick: Rutgers University Press, 1954), pp. 372-389.

THE PILOT STUDY⁴

The revised inventory of seventy-two items was administered to 325 high school students in college preparatory chemistry and physics classes.

All responses were recorded in six tables, as before, and responses to each item were double-dichotomized and the totals tabulated into 2x2 contingency tables. The association of high scale scores with positive responses was significant beyond the .001 level for each item.

Proportions of favorable responses to each item were then tabulated using the thirteen steps provided by the 12 items to rank order the 325 students. For example, of the 34 students giving favorable responses to eight items of the Prudent-Theoretic scale, thirty-one, or 91.2 per cent of them gave favorable responses to the first item. If the scales had been strictly cumulative, no reversals would have appeared in the list of proportions of favorable responses under each item. To eliminate a few reversals that did show up and thus to increase the coefficient of reproducibility the 12 items were grouped into three compound items by combining four items of approximately equal popularity. The four least popular items were combined to form elements of compound item A, and the four most popular items were combined to form elements of compound item C. The responses to the elements of each compound item were then dichotomized so that approximately equal proportions of the responses to the elements of any one compound item should be positive, but, at the same time, about 25 per cent of the respondents should give positive responses to three or four of the elements of compound item A, about 50 per cent

⁴ T. Bentley Edwards and Alan B. Wilson. "The Specialization of interests and academic achievement." Harvard Educational Review. Vol. XXVIII, No. 3, Summer, 1958, pp. 183-196.

should give positive responses to three or four of the elements of compound item B, and about 75 per cent should give positive responses to 3 or 4 of the elements of compound item C. In this way the elements of each compound are as equivalent as possible, and the resulting compound items are as different as possible from each other, "equivalent" and "different" being defined by the population of respondents rather than by a priori judgment. Positive responses to three or four of the elements of a compound item are scored as a positive response to the combined item.

Taking a coefficient of reproducibility as the proportion of responses which fit the cumulative pattern, the six four-point scales (3, 2, 1, 0) demonstrated coefficients of reproducibility from .90 - .95. Thus, within the limits of error described by the coefficient of reproducibility, the scale scores validly order the individuals along the continua defined by the content of the items. The rank ordering of individuals along the fixed continua that is obtained is therefore systematic and reliable. Any relationship that can be demonstrated between these variables and others can be explored with confidence that the speculation will lead to means for additional control.⁵

ATTITUDES AND ACADEMIC ACHIEVEMENT

When the scores on the Prudent-Theoretic scale were associated with curricular variables, with sex, and with achievement, a number of

⁵ T. Bentley Edwards and Alan B. Wilson, "The development of scales of attitudinal dimensions," The Journal of Experimental Education, Vol. XXVIII, No. 1, September, 1959 pp. 3-36. All six scales appear in this article. Items used in the inventory are listed in order of popularity of the "positive" responses, the popularity is given, and the items are grouped to form the compound items of each scale.

interesting comparisons were revealed. It was found, even among science students, that girls tend to have Prudent interests, and boys to have Theoretic interests. It was also found that the girls in this population had better over-all academic grades than the boys. While this also has been found to be true throughout schools, it was particularly striking to find so few girls with C and B averages enrolled in chemistry and physics as compared with the boys. However, boys with Prudent interests were found to get higher grades, on the average, than boys with Theoretic interests.

To provide information on the external validity of the scales, interviews were arranged with students. Several of the recorded protocols provided unmistakable evidence of Theoretic or Prudent attitudes, and the students interviewed registered corresponding scores on the Inventory of Choices. In addition, occupational aspirations were compared with scale scores and found to correspond.

Students registering high Prudent scores on the Prudent-Theoretic scale showed little or no advantage when given standardized tests in chemistry and physics. In fact, a slight, but not statistically reliable advantage was observed for those registering Theoretic interests.

Attrition rates among boys and girls taking science courses and varying scores on the Prudent-Theoretic scale were noted. Three variables were thus considered: sex, degree of Prudence, and willingness to continue with courses in chemistry and physics. It was observed that boys interested in science will continue to study chemistry and physics even though they receive C grades. By contrast, girls receiving C grades drop chemistry and physics courses to take easier science courses such as physiology or physical science, even when their interest in science is apparently high.

Converging findings supporting the interpretation that boys are motivated by intrinsic interest while girls are motivated by social recognition expressed by grades, came from the relation of another scale in the Inventory of Choices with sex and with achievement. This, the Theoretic-Immediate scale, was designed to discriminate between intrinsic interest in the study, laboratory, and research activities of natural scientists, and interest in social recognition and recreation -- that is orientation towards proximate ends. Boys, again, showed higher theoretic interests.

To this point, our findings indicated that:

1. Boys are more interested in natural science, on the average than girls; while girls are more interested in social studies, people, and social esteem.
2. Those who are more interested in social studies get higher over-all academic grades--a fact based primarily on their higher social studies and English grades.
3. Those who are primarily interested in science do not get higher grades, even in science, possibly because curricular and evaluative practices in the schools enable those who are interested in social esteem rather than the subject to achieve at a "mechanical" level which is not differentiated because heuristic problem-solving, transfer, and long-term retention are not measured.

If the level of teacher-assigned grades obscured the specialization of ability, the differential between grades assigned in science and mathematics, on the one hand, and social studies and English on the other, did not. Two groups of students were selected from the population; those whose grades in science and mathematics exceeded their own grades in social studies and English, and, v.v., those whose grades in social studies and English exceeded their science and mathematics grades. It was found that Theoretic students had specialized abilities in science and mathematics while Prudent students had specialized abilities in social studies and English.

Attempts to replicate these important findings with a larger sample seemed imperative.

DATA COLLECTED FROM THE LARGER SAMPLE

The major activity during the period of the contract has been the collection, organization, and preliminary analysis of data from a sample of 3750 high school students in the San Francisco Bay area. Most important of these data were the responses to the Inventory of Choices by the pupils themselves, and the information on sex, age, class, IQ, and grades, collected from extant records. Additional data were obtained by extending the questionnaire. These data will be used largely for exploratory purposes. Information obtained in this way included: a set of opinions regarding social issues; additional personal data such as parental education, race, religion, and number of siblings; post-graduation plans; a direct question concerning subjects liked best, and subjects liked least; vocational plans of pupil, and parent's occupation; school activities; out-of-school activities; and hobbies.

These data were pre-coded as far as possible. However, anticipation of most useful categories for a number of the questions was impossible in the absence of the information itself. Objectively defined categories were difficult to come by even with the returns at hand. Complete details of these categories will be reported in subsequent publications. All of the information was eventually coded in such a way that it could be recorded on IBM cards, with two cards needed for each pupil.

SAMPLING PROCEDURES

Although collection of responses from a large number of students was anticipated from the outset, the purpose of collecting these responses

has been enlarged. Originally, standardization of an inventory of attitudes to be used to assess curricular modifications was anticipated. The need to establish six scales with sufficiently high coefficients of reproducibility still loomed large, and establishment of norms for the particular group investigated would be comparatively easy. However, with the discovery by means of data collected from the pilot study that high Theoretic interest is linked with lower grades, and that girls tend to be Prudent and boys Theoretic, replication of these and other important findings became a major consideration.

A sample was, therefore, sought so as to include a wide range of the attitudes, abilities, and aspirations under consideration. Data collection was made easier in at least two ways, first by choosing schools within easy driving distance of Berkeley, and second, by choosing schools willing, for one reason or another, to cooperate in the study.

Descriptions were written for each of the sixty-odd high schools within a fifty-mile radius of the University. These schools were divided into four major groups according as they were found in areas classed by the Bureau of the Census as: metropolitan, urbanized areas, cities over 5000 and places under 5000. In the first of these, three large metropolitan schools were selected more or less arbitrarily to include an all-Negro school (School #11-Table 1), School #3 with representation from several social classes, and the school (#13) used in the pilot study. A unique private school (#2) in the metropolitan area was also included. This school is heavily endowed and is practically tuition-free for those boys able to meet the difficult entrance requirements. According to the terms of the endowment, all those attending the school must take courses in the manual and industrial arts shops along with their academic courses.

TABLE I

DISTRIBUTION OF FATHERS OCCUPATIONS

Schools							
Number	Community Setting	Manual Labor	White Collar	Small Business & Merchants	Farm Owner	Professional	Executive
1	Town--rural marketing center	42%	20%	19%	6%	7%	1%
2	Metropolitan--boys' private school	6	24	18	0	30	21
3	Metropolitan--heterogeneous	38	33	16	1	8	4
4	City--light industry	52	23	6	4	12	3
5	Town--rural	43	20	12	19	5	1
6	Town--rural	33	32	17	8	7	3
7	City--industrial	47	29	17	0	6	1
8	Urban--working class residential	55	32	11	0	1	1
9	Sub-urban	23	36	17	0	16	8
10	Urban--industrial	67	18	12	0	3	0
11	Metropolitan--Negro residential	74	14	6	0	6	0
12	Urban--upper class residential	2	19	19	0	25	35
13	Metropolitan--"white collar" residential	29	33	25	1	12	0
All Schools Combined		40%	27%	16%	3%	9%	5%

Attempts were made to achieve a representative sample in the Negro high school and the heterogeneous school. In the pilot study school, almost the entire population of Grade 11 was tested, and was the entire population from the private school. The total number of students selected from each area was chosen so as to match as nearly as possible the proportions of the population of the State of California living in such areas.

Again, using the data of the Bureau of Census as brought up to date by the California Comptroller's Report of 1955, the urbanized area was divided into two parts according as the property evaluation per capita was less than, or greater than, \$1500. One school (#8) was selected from an area with the lower property evaluation. This city is largely filled with the homes of working-class urban citizens. The students were selected for testing by the principal on the basis of the request that the group chosen be as representative as possible. Three schools were chosen from sections of the urbanized area with a property evaluation per capita over \$1500. One of these (#10) with more than 20 per cent of the labor force in manufacturing, is a school in a heavily industrialized area with most of the parents either skilled or unskilled workers. Two schools were chosen from the urbanized area with a property evaluation per capita in excess of \$1500 and with less than 20 per cent of the labor force in manufacturing. One of these, School Nine, is in a district where the value of taxable transactions is over \$200 per capita per quarter drawing from a suburban population composed largely of white-collar workers and business and professional people. The other, (School #12) in a district where the value of taxable transactions is under \$200 per capita turns out to be an upper-class residential district with three-fifths of the fathers either professionals or executives.

In the third category, cities over 5000 population, two schools were chosen according to whether more or less than 20 per cent of the labor force was engaged in manufacturing. Thus, School Seven, is found in an industrial city, well toward the perimeter of the circle of 50-mile radius, with nearly half the fathers engaged in manual labor, and School Four is found in a more balanced community with light, rather than heavy industry. Yet slightly more than half the fathers of the children from School Four are engaged in manual labor.

In the fourth category, urban places under 5000 population, three schools were chosen according to whether the average daily attendance was more or less than 500. School Number One serves an agricultural trading center in which there is a fairly extensive tourist and summer resident trade. Schools Five and Six are smaller and serve the needs of rural agricultural towns. Two of these small schools were chosen to provide the necessary balance. It can be seen that the actual sample just described follows closely the specifications given in our Progress Report of January 31.

Additional information concerning the sample is provided in Tables 2, 3, and 4. These tables are self-explanatory. Percentages given are all rounded off to the nearest whole number except that adjustments are made to yield totals of 100 per cent in all cases. Table 4 is the first to show the number of cases from each school. As stated previously, numbers were selected so as to match, as closely as possible, the proportions of the population living in areas categorized by the Bureau of the Census as Metropolitan, Urbanized Area, etc.

TABLE II

DISTRIBUTION OF FATHERS' EDUCATION

Fathers' education terminated during or at conclusion of:	All Schools Combined													
	1	2	3	4	5	6	7	8	9	10	11	12	13	
Elementary school	25%	3%	19%	28%	46%	17%	37%	28%	11%	23%	32%	0%	11%	22%
High School	51	18	49	48	35	53	49	57	42	60	40	20	45	45
College	19	44	21	13	13	17	9	9	34	8	16	50	31	21
Post-graduate	5	34	9	8	4	11	4	3	12	0	4	26	10	9
Not available	0	1	2	3	2	2	1	3	1	9	8	4	3	3

TABLE III

DISTRIBUTION OF IQ TEST SCORES

IQ Scores	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
150 plus	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	0%	1%	1%	0%
140-149	0	1	1	0	0	1	1	0	0	1	0	2	2	1
130-139	1	6	3	2	1	3	1	1	2	0	0	10	6	2
120-129	6	24	12	3	3	4	7	4	7	9	1	26	11	8
110-119	21	43	20	15	17	15	23	12	16	9	8	27	24	18
100-109	27	25	22	9	38	21	31	16	22	28	22	16	21	20
90-99	23	1	15	10	21	15	21	14	16	23	24	11	12	15
80-89	12	0	14	3	5	12	6	7	5	23	25	2	7	9
70-79	5	0	7	2	2	1	1	2	2	1	17	0	2	4
60-69	0	0	1	0	0	1	1	1	0	0	1	0	0	1
below 60	0	0	1	0	0	0	0	1	0	0	0	0	0	0
Not Available	5	0	4	56	13	27	8	42	30	6	2	5	14	22
Test	Mix	Otis	T-M	CM	CM-p	CM	Otis	T-M	Otis	CM	T-M	T-M	T-M	

TABLE IV
RACIAL DISTRIBUTION

Race	1	2	3	4	5	6	7	8	9	10	11	12	13	All Schools Combined
Negro	0%	1%	29%	1%	0%	1%	10%	1%	0%	22%	91%	0%	7%	13%
Oriental	0	2	10	0	4	2	3	1	0	4	2	0	6	3
White	100	97	60	97	96	96	86	97	99	71	5	99	86	83
Not Available	0	0	1	2	0	1	1	1	1	3	2	1	1	1
Number of Cases	388	160	380	227	135	141	222	538	288	123	311	96	601	3750

RE-ESTABLISHMENT OF THE SCALES

With the responses of all students to the items of the various scales recorded on IBM cards, the frequencies of responses in each of the six categories, "strongly agree," "moderately agree," etc., were counted. Addition of the appropriate frequencies indicated the number of students for or against a particular item. With these totals, the twelve items of each scale were ranked by schools according to popularity. Examination of Tables 5-10 shows a rank ordering of items in each of the thirteen schools that is essentially similar. The rank ordering of items in the pilot study, though not included in these tables, was equally similar. The Kendall coefficient of concordance, was calculated for each of the scales. The values range from .73 to .90. These coefficients are all significant beyond the .001 level. It must be born in mind while reading these scales that the twelve single items of each scale are to be used for three items, each compound item being formed by the combination of four single items of approximately equal popularity; this use of the "H-technique" of Stouffer eliminating most of the effect of the variation between schools in the popularity of individual items. Several of these differences are suggestive, however. Item 21, Table 5, is especially unpopular at School Two as it was in the pilot study. School Two is a private school for boys which emphasizes work in the various shops. The item offers the following advice:

21. In our complex industrial civilization, a young person should specialize early and stick to it.

Disagreeing with this item is assumed to be an indication of Prudent preferences rather than Theoretic. The boys at this school, more strongly Theoretic than those found in other schools, may not place as much stock

TABLE V

RANK ORDER OF POPULARITY OF THE ITEMS OF THE PRUDENT-THEORETIC SCALE*

Item No.	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
17	1	1	3	1	3	2	1	1	1	2	4	1	1	1
73	2	2	1	2	2	1	2	3	2	3	2	2	2	2
21	4	9	2	3	1	3	3	2	3	1	1	4	3	3
54	3	5	4	4	6	4	4	4	4	4	5	3	4	4
59	5	5.5	5.5	7	4	5	5	6	5	5	3	5.5	6	5
12	6	4	8	6	7	10	6	7	7	6	10	9.5	5	6
49	8	5.5	5.5	8	5	8	9	5	6	10	6	5.5	7.5	7
45	7	8	7	5	8	6	7	8	8	7	8	7	7.5	8
64	9	7	10	9	9	7	8	9	10	8	7	9.5	9	9
35	11	10.5	9	12	10	11	10	12	9	11.5	9	8	10.5	10
40	10	10.5	11	10	12	9	12	10	11	9	11	11	10.5	11
6	12	12	12	11	11	12	11	11	12	11.5	12	12	12	12

Coefficient of Concordance, V : .89 Chi-squared: 127.3 Probability < .001

*The "popularity" of an item at a given school is based upon the proportion of individuals at that school giving "prudent" responses to the item.

TABLE VI

RANK ORDER OF POPULARITY OF THE ITEMS OF THE THEORETIC-IMMEDIATE SCALE*

Item No.	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
15	1	1	1	1	2	1	1	1	1	2	2	1	1	1
11	2	4.5	2	2	1	2	3	2	3	1	1	2	3	2
36	4	4.5	3	4	4.5	5	2	3	2	4	6	9	2	3
27	3	2	5	3	3	3	7	4	5	5	4	6	4	4
58	7.5	9	4	8	6.5	4	4.5	6	6	3	3	8	5.5	5
46	5	7	6	6	6.5	6	9	7.5	4	7	9	4	5.5	6
63	7.5	10	7	7	4.5	7	8	7.5	7	6	7	6	7	7
67	6	4.5	9	5	9	10	6	5	9	8	8	6	8	8
7	9	4.5	8	9	8	8.5	4.5	9.5	11	9	5	10	9	9
19	10.5	8	10	10.5	10	8.5	12	9.5	8	10	10	3	10	10
74	10.5	11	11	10.5	11	11	10	11	10	11	11	12	11	11
51	12	12	12	12	12	12	11	12	12	12	12	11	12	12

Coefficient of Concordance, W : .82 Chi-squared: 117.8 Probability < .001

*The "popularity" of an item at a given school is based upon the proportion of individuals at that school giving "theoretic" responses to the item.

TABLE VII

RANK ORDER OF POPULARITY OF THE ITEMS OF THE PRUDENT-IMMEDIATE SCALE*

Item No.	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
26	1	6	1	1	1	2	1	1	1	2	1	3	1	1
24	2	2	2	2	2	1	2	2	2	1	2	2	5	2
41	4	4	4.5	3	3	6	5	3	3	4	3.5	6	2.5	3
70	5.5	3	3	6	5	3	3	5	5	3	3.5	5	4	4.5
9	3	7	4.5	4	4	4	4	4	6	5	5	4	2.5	4.5
76	5.5	1	6	7	6.5	5	7	6	4	6	6	1	6	6
31	7	5	7	5	6.5	8.5	6	7	7	7	7	7	7	7
65	8	11	8	8	8	7	8	9	8	8.5	8	8	8	8
14	9	9	9	9	9.5	10	9	8	9	10	9.5	9	9	9
44	10	10	12	10	9.5	11	10.5	10	10	12	11.5	10	10	10.5
56	12	8	10	11.5	11.5	8.5	12	11.5	11	8.5	9.5	11	11.5	10.5
50	11	12	11	11.5	11.5	12	10.5	11.5	12	11	11.5	12	11.5	12

Coefficient of Concordance, W: .90 Chi-squared: 128.7 Probability < .001

*The "popularity" of an item at a given school is based upon the proportion of individuals at that school giving "prudent" responses to the item.

TABLE VIII

RANK ORDER OF POPULARITY OF THE ITEMS OF THE PRUDENT-AESTHETIC SCALE*

Item No.	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
39	1	1	1	1	1	1	1	1	1	2	3.5	1	1	1
25	2	7	2	4	2	3	2	3	4	1	1	4	2	2
69	4	2	5	3	4	2	3	2	2	3	5	2	3	3
62	3	4	3.5	2	3	5	4	4	3	4	8	5.5	4	4
34	5	5	3.5	5	5	4	5	5	5	5.5	3.5	3	6.5	5
75	8	3	8	8.5	11	10.5	6	6.5	6.5	9.5	10	5.5	5	6
57	8	9	7	6	10	7	7.5	11	9.5	5.5	2	10	10.5	7.5
53	6	6	11	8.5	9	8	10	6.5	6.5	9.5	11	7	6.5	7.5
32	8	10	9	8.5	8	6	7.5	8	11	8	6	9	10.5	9
8	11	8	10	8.5	6.5	10.5	9	9.5	8	11	9	8	8	10.5
13	10	11	6	11	6.5	9	11	9.5	9.5	7	7	11	9	10.5
47	12	12	12	12	12	12	12	12	12	12	12	12	12	12

Coefficient of Concordance, W: .81 Chi-squared: 115.8 Probability < .001

*The "popularity" of an item at a given school is based upon the proportion of individuals at that school giving "prudent" responses to the item.

TABLE IX

RANK ORDER OF POPULARITY OF THE ITEMS OF THE THEORETIC-AESTHETIC SCALE*

Item No.	School Number												All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13
61	1	1	1.5	1	1	1	1.5	1	1	3	5.5	1	1
38	2	2	1.5	2	3	2	1.5	2	2	1	1	3	2
22	3	6	3	3	2	4	3	3	3	2	2	5.5	3
52	5	3	4	6	4	3	5.5	4	5	8	3.5	2	4
71	4	4.5	5.5	5	5	5	4	5	4	4	8	5.5	5
66	6	4.5	8	4	8.5	6	5.5	8	6	7	9	4	6
26	7.5	8.5	5.5	7.5	6	7.5	7	6.5	9.5	9	3.5	9	7.5
43	7.5	10.5	9	9	7	9	8.5	6.5	8	5.5	5.5	8	7.5
33	9	8.5	7	7.5	8.5	7.5	8.5	9	7	5.5	7	7	9
30	10.5	7	11	10.5	10	11.5	11	10	9.5	12	12	11	10
18	10.5	12	10	12	12	10	10	11	12	11	10	12	11
77	12	10.5	12	10.5	11	11.5	12	12	11	10	11	10	12

Coefficient of Concordance, W: .88 Chi-squared: 125.8 Probability < .001

*The "popularity" of an item at a given school is based upon the proportion of individuals at that school giving "theoretic" responses to the item.

TABLE X

RANK ORDER OF POPULARITY OF THE ITEMS OF THE AESTHETIC-IMMEDIATE SCALE*

Item No.	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
29	2	4	1	2.5	2	1	1	1	3	3	2	2.5	1	1.5
55	1	10	3.5	1	1	3	2	2	1	1	1	6	4	1.5
48	3	1	2	6	4	2	4	3	2	2	3	1	3	3
42	7.5	8	3.5	4.5	6	4	5.5	4	6	4	5.5	2.5	2	4
72	7.5	3	5.5	2.5	7	6.5	3	5	5	10	10	4	5	5
23	4	9	5.5	7	8.5	6.5	9	8	4	5	4	8	7.5	6
16	9.5	7	7	9.5	5	11	5.5	6.5	7	7	7	10.5	6	7.5
68	5	2	10	4.5	8.5	6.5	8	10.5	9	6	8	5	7.5	7.5
10	6	6	8	9.5	3	6.5	7	6.5	9	8	5.5	10.5	9.5	9
60	9.5	5	9	8	10	9	10	9	9	11	11	9	9.5	10
20	11	12	11	11	11	10	11	10.5	12	9	9	12	12	11
37	12	11	12	12	12	12	12	12	11	12	12	7	11	12

Coefficient of Concordance, W: .73 Chi-squared: 104.4 Probability < .001

*The "popularity" of an item at a given school is based upon the proportion of individuals at that school giving "aesthetic" responses to the item.

in this ready formula for success as do high school students generally. The item has a different meaning for them.

On the Theoretic-Aesthetic scale only the children from School Two and Twelve regard a preference for chess as a significant hurdle for the Theoretic. By way of contrast Item 52--

52. A person should throw himself into life with vitality--the scientist's reflexion on how things work is a wet-blanket on the spontaneous pleasure of affection.

--is less popular than generally at School Ten and more popular at School Twelve.

There is a temptation to speculate on the reasons for the irregularities almost endlessly. The fact that rational interpretation for each of these irregularities presents itself almost immediately reassures us that they are not the consequences of unreliability. The explanations themselves are not particularly relevant to the general argument, hence there will be no attempt to complete the discussion at this point.

In Tables 11-16 inclusive, items of approximately equal popularity, are placed in groups of four. These groupings are obtained directly from the set of tables immediately preceding--the rows of Tables 5-10 becoming the columns of Tables 11-16. The rows of Tables 11-16 are the seven response categories for each item. An "indifferent" category has been added because a very few students were presumably unable to make up their minds between "slightly agree," and "slightly disagree," and checked both spaces, or omitted the item.

Beginning with the total percentages of the 3750 responses in the first category, the percentages are accumulated by adding the percentage in each successive category to the previous totals. Cutting points for each item are determined, as in the pilot study, so as to make sure that approximately

TABLE XI

CUMULATIVE PERCENTAGES OF RESPONSES IN EACH CATEGORY OF EACH ITEM OF

THE PRUDENT-THEORETIC SCALE*

Description of Response Category	Compound Item A				Compound Item B				Compound Item C			
	17	73	21	54	59	12	49	45	64	35	40	6
Strongly prudent	8%	6%	10%	11%	10%	14%	20%	19%	16%	33%	25%	17%
	16	15	20	23	27	30	32	32	34	49	44	48
Moderately prudent	25	26	31	36	43	46	46	47	51	61	62	66
Slightly prudent	25	27	32	36	44	47	47	48	53	62	63	67
Indifferent	37	47	46	51	61	61	60	62	71	71	72	72
Slightly theoretic	58	73	70	71	79	78	74	77	86	83	90	89
Moderately theoretic	100	100	100	100	100	100	100	100	100	100	100	100
Strongly theoretic												

*The response categories to each item are dichotomized into responses considered to be "prudent" and those considered to be "theoretic" for the purpose of scoring individuals on the compound items.

TABLE XII

CUMULATIVE PERCENTAGES OF RESPONSES IN EACH CATEGORY OF EACH ITEM OF

THE THEORETIC-IMMEDIATE SCALE*

Description of Response Category	Compound Item A				Compound Item B				Compound Item C			
	15	11	36	27	58	46	63	67	7	19	74	51
Strongly theoretic	5%	13%	19%	16%	18%	13%	23%	13%	24%	34%	19%	34%
Moderately theoretic	13	23	33	32	33	29	39	33	46	49	44	58
Slightly theoretic	26	36	43	44	49	52	53	54	58	63	68	77
Indifferent	26	36	43	44	50	53	54	56	58	63	69	78
Slightly immediate	36	52	59	59	64	72	70	73	69	74	83	88
Moderately immediate	56	73	77	78	79	86	85	89	81	86	92	95
Strongly immediate	100	100	100	100	100	100	100	100	100	100	100	100

*The response categories to each item are dichotomized into responses considered to be "theoretic" and those considered to be "immediate" for the purpose of scoring individuals on the compound items.

TABLE XXII

CUMULATIVE PERCENTAGES OF RESPONSES IN EACH CATEGORY OF EACH ITEM OF

THE PRUDENT-IMMEDIATE SCALE*

Description of Response Category	Compound Item A				Compound Item B				Compound Item C			
	28	24	41	70	9	76	31	65	14	44	56	50
Strongly prudent	8%	12%	18%	21%	19%	28%	11%	27%	33%	23%	33%	51%
Moderately prudent	19	24	30	33	32	40	31	46	56	52	59	66
Slightly prudent	32	36	43	45	45	52	56	68	71	77	77	80
Indifferent	32	36	43	46	45	53	58	69	71	77	78	82
Slightly immediate	48	50	58	66	63	70	76	87	83	89	87	90
Moderately immediate	69	69	76	83	84	84	88	95	94	96	94	94
Strongly immediate	100	100	100	100	100	100	100	100	100	100	100	100

*The response categories to each item are dichotomized into responses considered to be "prudent" and those considered to be "immediate" for the purpose of scoring individuals on the compound items.

TABLE XIV

CUMULATIVE PERCENTAGES OF RESPONSES IN EACH CATEGORY OF EACH ITEM OF

THE PRUDENT-AESTHETIC SCALE*

Description of Response Category	Compound Item A				Compound Item B				Compound Item C			
	39	25	69	62	34	75	57	53	32	8	13	47
Strongly prudent	13%	19%	14%	24%	21%	45%	38%	31%	33%	28%	42%	47%
Moderately prudent	22	<u>33</u>	31	<u>40</u>	39	<u>60</u>	<u>56</u>	54	56	54	61	<u>72</u>
Slightly prudent	31	47	<u>51</u>	54	60	70	71	<u>71</u>	73	74	74	87
Indifferent	32	47	51	55	<u>61</u>	70	72	72	73	75	<u>74</u>	88
Slightly aesthetic	<u>45</u>	67	67	67	80	84	89	83	<u>84</u>	<u>83</u>	85	94
Moderately aesthetic	63	84	80	79	92	92	96	92	93	90	92	97
Strongly aesthetic	100	100	100	100	100	100	100	100	100	100	100	100

*The response categories to each item are dichotomized into responses considered to be "prudent" and those considered to be "aesthetic" for the purpose of scoring individuals on the compound items.

TABLE XV

CUMULATIVE PERCENTAGES OF RESPONSES IN EACH CATEGORY OF EACH ITEM OF

THE THEORETIC-AESTHETIC SCALE*

Description of Response Category	Compound Item A				Compound Item B				Compound Item C			
	61	38	22	52	71	66	26	43	33	30	18	77
Strongly theoretic	11%	11%	21%	14%	14%	21%	30%	26%	34%	41%	54%	32%
Moderately theoretic	22	23	32	30	33	41	46	46	50	63	70	60
Slightly theoretic	32	36	42	51	52	59	63	63	64	79	80	81
Indifferent	32	36	43	53	53	60	64	65	64	72	80	81
Slightly aesthetic	46	54	56	79	70	78	80	77	80	89	88	88
Moderately aesthetic	71	75	70	92	86	91	92	87	91	95	94	94
Strongly aesthetic	100	100	100	100	100	100	100	100	100	100	100	100

*The response categories to each item are dichotomized into responses considered to be "theoretic" and those considered to be "aesthetic" for the purpose of scoring individuals on the compound items.

TABLE XVI

CUMULATIVE PERCENTAGES OF RESPONSES IN EACH CATEGORY OF EACH ITEM OF
THE AESTHETIC-IMMEDIATE SCALE*

Description of Response Category	Compound Item A		Compound Item B		Compound Item C							
	29	51	48	42	72	23	16	68	10	60	20	37
Strongly aesthetic	10%	7%	9%	11%	10%	17%	15%	10%	18%	13%	18%	28%
Moderately aesthetic	17	15	18	22	21	27	25	21	30	25	31	43
Slightly aesthetic	24	24	26	32	34	35	38	38	39	43	50	55
Indifferent	24	24	26	33	35	36	39	38	39	45	52	56
Slightly immediate	33	31	32	36	49	45	54	52	51	67	74	67
Moderately immediate	42	53	62	66	68	61	72	78	65	81	88	72
Strongly immediate	100	100	100	100	100	100	100	100	100	100	100	100

*The response categories to each item are dichotomized into responses considered to be "aesthetic" and those considered to be "immediate" for the purpose of scoring individuals on the compound items.

25 per cent of the students score 3, another 25 per cent score 2, another 25 per cent score 1, and 25 per cent score 0. The numbers underlined must always be greater than 25, 50, 75, because of the non-scale individuals. For example, if the cutting point chosen for the elements of compound items C were only 75 per cent, there would not be enough negative responses to this item to provide the needed 25 per cent of 0 scores as well as the non-scale scores among the scores of 1 and 2.

Tables 17-22, prepared with the help of the sorter-counter provide the information needed to calculate the coefficient of reproducibility of each school for each grade. This coefficient has been described before in the report and is defined by the formula:

$$C.R. = \frac{N - \text{errors}}{N}$$

where N is the total number of responses. To use the information provided in Tables 17-22 to calculate the coefficient of reproducibility the total number of non-scale individuals must be multiplied by 2 to get the total number of errors, and the number of individuals multiplied by 3 to get the total number of responses. Reference to Table 17 will make the calculation clear. School Number One shows $25 + 2 + 7 + 6 = 40$ non-scale individuals from a total of 308. Hence there were 80 errors among 1164 responses, and the coefficient of reproducibility is equal to $\frac{1084}{1164} = .93$.

No students in grade nine were included in the totals for individual schools. Students in grade nine were included in the column headed "All Schools Combined." Hence the totals in the last column did not check when the rows were totalled horizontally.

TABLE VIII

FREQUENCY OF RESPONSES OF EACH PATTERN TO THE COMBINED ITEMS OF
THE FREQUENCY-ETHNIC SCALE

Score	Response Pattern A B C	School Number													All Schools Combined
		1	2	3	4	5	6	7	8	9	10	11	12	13	
3	+++	34	24	56	33	25	22	30	63	62	17	30	20	140	601
2	--+	154	41	149	61	49	60	64	208	100	53	106	41	245	1420
	++--	25	3	18	16	6	4	9	27	12	7	22	3	24	154
	+++-	2	1	3	2	0	1	1	5	2	1	2	1	0	21
1	---+	105	44	91	52	32	28	49	122	59	30	86	20	111	671
	---+	7	3	13	5	3	10	5	13	9	6	14	2	15	110
	----	6	2	6	4	3	1	2	5	1	1	2	0	5	40
0	----	55	42	44	34	17	15	34	75	43	8	41	9	61	503
Number of Cases		308	160	300	227	135	141	222	536	263	123	311	96	601	3750
Coefficient of Reproducibility		.93	.96	.93	.92	.94	.92	.95	.94	.94	.92	.91	.96	.95	.94

*Non-cumulative response patterns, classed as errors.

TABLE IVIII

FREQUENCY OF RESPONSES OF EACH PATTERN TO THE COMBINED ITEMS OF
THE THERMATIC-IMAGINATE SCALE

Score	Response Patterns A B C	School Number													All Schools Combined
		1	2	3	4	5	6	7	8	9	10	11	12	13	
3	+++	34	42	45	26	11	22	34	53	37	9	59	15	66	403
2	-++	149	58	111	70	47	42	81	162	84	39	115	16	169	1218
	++-	22	15	38	11	10	12	24	35	25	14	21	11	37	282
	+++	4	4	3	5	3	3	1	3	2	0	4	2	6	41
1	--+	126	26	107	70	42	42	58	162	86	49	82	33	211	1123
	-+-	13	4	16	12	6	5	5	24	7	1	12	1	17	128
	+-	4	1	7	1	2	1	2	17	7	0	4	0	11	63
0	---	35	10	53	32	14	14	17	62	40	11	14	18	84	412
Number of Cases		308	160	380	227	135	141	202	538	288	123	311	96	601	3750
Coefficient of Reproducibility		.93	.90	.89	.91	.90	.90	.90	.90	.90	.92	.91	.90	.92	.91

* Non-cumulative response patterns, classed as errors.

TABLE III

FREQUENCY OF RESPONSES OF EACH PATTERN TO THE COMBINED ITEMS OF
THE FREQUENCY-INCUBATE SCALE

Response Patterns		School Number													All Schools Combined
Score	A B C	1	2	3	4	5	6	7	8	9	10	11	12	13	
3	+++	44	23	46	25	18	27	32	56	38	10	38	19	110	500
2	--++	111	50	117	55	41	33	65	149	87	25	83	22	144	1001
	++--+	35	21	28	22	6	10	20	37	28	3	19	8	48	294
	++++	8	3	13	6	2	3	3	13	10	4	3	3	13	85
1	---+	117	45	103	60	39	31	70	157	76	33	89	31	159	1060
	+++-	28	13	24	18	15	20	12	43	17	19	28	2	36	286
	++--	4	2	11	5	4	2	4	8	4	3	13	2	14	79
0	----	41	15	38	37	10	15	16	75	28	26	38	9	77	445
Number of Cases		300	160	300	227	135	141	222	538	288	123	311	96	601	3750
Coefficient of Reproducibility															.87
															.87
															.86
															.90
															.88

*Non-cumulative response patterns, classed as errors.

TABLE II

FREQUENCY OF RESPONSES OF EACH PATTERN TO THE COMBINED ITEMS OF
THE FREIGHT-ARITHMETIC SCALE

Score	Response Pattern A B C	School Number												All Schools Combined
		1	2	3	4	5	6	7	8	9	10	11	12	13
3	+++	43	13	65	22	15	16	32	57	32	11	54	16	111
2	--++	135	59	105	78	46	53	70	181	86	31	55	26	146
	*+--+	15	15	15	2	4	12	16	18	22	7	33	5	47
	++-	4	0	7	3	2	2	6	11	4	2	12	0	18
1	---+	116	58	110	70	34	40	57	154	82	33	86	29	154
	*--+-	26	1	22	21	12	6	15	40	14	10	15	2	48
	*+---	7	0	8	3	3	1	4	7	5	4	14	0	10
0	----	42	14	48	28	19	11	22	70	41	25	42	18	67
Number of Cases		300	160	300	227	135	141	222	538	288	123	311	96	601
Coefficient of Reproducibility		.91	.93	.91	.91	.90	.90	.88	.91	.90	.88	.84	.95	.86
														.89

*Non-cumulative response patterns, classed as errors.

TABLE III

FREQUENCY OF RESPONSES OF EACH PATTERN TO THE COMBINED ITEMS OF
THE THEORETIC-ANALYTIC SCALE

Score	Response Pattern A B C	School Number													All Schools Combined
		1	2	3	4	5	6	7	8	9	10	11	12	13	
3	+++	55	66	36	36	18	24	36	74	46	14	39	14	85	567
2	-++	141	48	91	49	36	50	56	160	79	27	73	23	184	1066
	*+--	23	11	25	25	9	10	23	31	19	8	24	8	38	262
	*+ +-	6	2	7	3	3	1	5	9	4	0	2	1	10	55
1	--+	115	24	118	65	51	42	75	155	94	50	106	27	179	1146
	*--+-	12	5	20	17	2	2	8	23	18	3	16	5	23	156
	*+---	2	0	6	4	0	2	3	14	4	3	11	0	7	57
0	----	34	4	77	28	16	10	16	72	24	18	40	18	75	441
Number of Cases		398	160	380	227	135	141	222	538	288	123	311	96	601	3750
Coefficient of Reproducibility		.93	.92	.90	.86	.93	.93	.88	.90	.90	.92	.89	.90	.91	.91

*Non-cumulative response patterns, classed as errors.

TABLE XIII

FREQUENCY OF RESPONSES OF EACH PATTERN TO THE COMBINED ITEMS OF
THE AESTHETIC-IMMEDIATE SCALE

Response Pattern		School Number													All Schools Combined
Score	A B C	1	2	3	4	5	6	7	8	9	10	11	12	13	
3	+++	65	52	59	36	23	25	27	71	57	11	18	12	108	589
2	--+	97	26	91	77	37	40	48	126	72	37	75	22	139	923
	*+--+	29	20	21	9	5	7	14	28	20	3	14	8	53	242
	*++--	6	5	10	6	4	2	3	20	2	1	2	2	12	81
1	--+	112	31	103	66	33	42	80	158	79	40	93	21	165	1063
	*--+-	26	11	31	10	10	6	13	32	18	6	33	7	38	246
	*+---	4	11	6	3	3	3	1	6	5	3	2	1	6	45
0	---	49	14	59	20	20	16	36	97	35	22	74	23	80	561
Number of Cases		308	160	380	227	135	141	222	538	288	123	311	96	601	3750
Coefficient of Reproducibility		.89	.84	.88	.92	.89	.91	.91	.89	.90	.93	.89	.88	.88	.89

* Non-cumulative response patterns, classed as errors.

SCALE SCORES--GRADES AND SEX

Table 23 compares grades and sex by showing, for example, percentage of the A students in each school who are boys. Leaving out the school for boys only, the table shows clearly that the girls get more than their share of the higher grades. The relationship is almost invariably linear. In four of the co-educational schools, boys managed to capture all the F's that were awarded. Table 24 compares scores on the Prudent-Theoretic scale with sex by dividing the number of individuals achieving each scale score at each school into boys and girls. Again, the relationship is linear (and strikingly uniform) with girls in the majority among the Prudent and boys in the majority among those who are highly Theoretic.

Table 25 compares scores on the Prudent-Theoretic scale with grades by listing the percentage of individuals achieving each scale score at each school who also obtained median academic grades of A or B. At School Eight, for example, 37 per cent of the most highly Prudent obtained A or B grades. By contrast, only 22 per cent of the most highly Theoretic obtained A or B grades. At six schools (Three, Five, Eight, Nine, Ten, Thirteen) the relationship is practically linear, thus replicating this important finding of the pilot study. At three schools (One, Seven, and Four) there is a slight curvilinearity. At these schools the highly Theoretic students are not given as many high grades as those highly Prudent, but they are slightly better off than those who have intermediate attitudes. At three other schools, Six, Eleven, and Twelve, the highly Theoretic students achieve the highest percentage of high grades. At the remaining school, Two, few low grades are awarded. Hence, each of the percentages shown is comparatively high. The fact that the strong association between a high Prudent score and high grade, as revealed by

TABLE XIII
PERCENTAGE OF STUDENTS ATTAINING EACH MEDIAN ACADEMIC GRADE
WHO ARE BOYS*

Median Academic Grade	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
A	47%	100%	18%	29%	17%	46%	19%	33%	40%	12%	25%	33%	57%	45%
B	32	100	32	33	40	35	42	30	34	19	19	53	36	41
C	53	100	47	61	73	47	61	48	54	49	42	54	50	53
D	61	100	66	72	100	59	86	59	73	55	63	85	67	67
F	83	100	100	75	50	75	100	87	50	100	64	--	100	84
Total	52%	100%	48%	58%	58%	48%	53%	49%	49%	42%	45%	55%	50%	53%

*The percentage of girls attaining each median academic grade is the converse of the percentage of boys. E.g., for all schools combined, the percentage of girls attaining each median academic grade is:

Sex	Median Academic Grade				
	A	B	C	D	F
Boys	45%	41%	53%	67%	84%
Girls	55%	59%	47%	33%	16%
Number of cases	265	919	1592	799	75

TABLE XXIV

PERCENTAGE OF STUDENTS RECEIVING EACH SCORE OF
THE FREUDENBERG-THORNTON SCALE WHO ARE BOYS*

Scale Scores	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
3	18%	100%	32%	30%	28%	36%	29%	25%	31%	24%	32%	45%	31%	33%
2	37	100	37	53	36	32	38	41	36	36	40	47	42	42
1	70	100	62	66	76	62	82	59	61	51	49	73	65	66
0	78	100	80	88	94	93	74	84	88	88	66	78	89	84

*The percentage of girls receiving each score is the converse of the percentage of boys. E.g., for all schools combined, the sex distribution at each scale score is:

Sex	Scale Scores			
	3	2	1	0
Boys	33%	42%	66%	84%
Girls	67%	58%	34%	16%
Number of Cases	594	1606	1012	498

TABLE XXV

PERCENTAGE OF STUDENTS RECEIVING EACH SCORE OF THE PRUDENT-THEORETIC SCALE

WHO ATTAINED MEDIAN ACADEMIC GRADES OF "A" OR "B"

Scale Scores	School Number													All Schools Combined
	1	2	3	4	5	6	7	8	9	10	11	12	13	
3	39%	75%	47%	39%	64%	41%	59%	37%	62%	24%	14%	45%	48%	45%
2	26	64	36	24	43	31	48	24	41	30	14	47	33	32
1	17	67	18	16	38	23	36	20	42	32	21	50	31	29
0	26	74	20	29	29	60	47	22	33	12	29	78	35	36

data collected for the pilot study, was replicated in half of the schools is extremely provocative and stresses the need for additional exploration. Such exploration is time-consuming and, although a start on it has been made, few findings are sufficiently clear to warrant a report on them at this time.

Table 26 is an example of the exploration to date. Because the individuals in the pilot study were all enrolled in chemistry, physics, or both of these specialized sciences, 11th and 12th graders taking chemistry and/or physics were again selected to check the influence of specialized interests upon academic achievement. To elucidate the situation still further boys and girls were separated. This table shows a high degree of similarity to a table composed of data from the pilot study.⁶ For the girls, the figures in the two tables are almost identical (the pilot study showed 83%, 69%, 63%, 64%). For the boys, the percentage of the Highly Prudent receiving high grades is decreased (the pilot study showed 75%, 55%, 49%, and 38%).

Information provided in Table 27 records another attempt to explore the relationship between grades bestowed and Prudent-Theoretic interest. The curvilinearity is still in evidence all through the tables. A Prudent orientation provides girls with a slight advantage in social studies and English. In mathematics, Theoretic interest is shown to be advantageous for both boys and girls. The same interests help the boys in general science and biology but do not help the girls. Theoretic interest is a

⁶ T. Bentley Edwards and Alan B. Wilson, "The Specialization of interests and academic achievement," Harvard Educational Review, Vol. XXVIII, No. 3, Summer 1958, pp. 183-196.

TABLE XLVI

INFLUENCE OF FREQUENT VS. THEORETIC LETTERINGS UPON MEDIAN ACADEMIC GRADES
 AMONG ELEVENTH AND TWELFTH GRADE STUDENTS WHO HAVE ENROLLED IN CHEMISTRY
 AND/OR PHYSICS BY SEX

Median Academic Grades	Boys		Girls	
	Prudent	Theoretic	Prudent	Theoretic
	3	2 1 0	3	2 1 0
High: A, B	624	454 436 536	844	704 714 654
Low: C, D, F	39	55 57 47	16	30 29 35
Number of Cases	72	158 157 134	96	154 66 80

TABLE XVII
PERCENTAGES ATTAINING "A" AND "B" GRADES AT EACH SCORE OF THE PRUDENT-THEORETIC SCALE
BY SUBJECT AREA AND SEX

Subject Area	Boys				Girls			
	Prudent		Theoretic		Prudent		Theoretic	
	3	2	1	0	3	2	1	0
Social Studies & English	34	25	25	35	55	44	30	47
Algebra, Geometry, & Trigonometry	33	27	32	42	37	30	33	46
General Science, Biology, etc.	34	25	32	45	44	36	36	43
Chemistry & Physics	51	34	44	51	51	45	35	35
Median Academic Grade	32	22	24	35	51	39	37	45

might help to girls in chemistry and physics but not to boys. Again, the median academic grades are higher for girls but the relationships for both boys and girls are curvilinear.

Table 28 relates Prudent-Theoretic scale scores with occupational aspirations. Percentages in the lower half of the table are complementary to those in the upper half. Without exception, the relationships prove to be linear in the expected directions. Few strongly Theoretic students aspire to enter social service, and few of those who are strongly Prudent aspire to be engineers or mathematicians. Again, the comparison with information obtained in the pilot study is almost identical.

Table 29 compares the sexes with respect to influence of grades upon enrollment in chemistry and/or physics. Part B supports the general contention that these subjects attract only the better students, however, part C replicates an interesting finding of the pilot study. The ratio of boys to girls in the group receiving C is more than 4 times what it is in the group receiving an A. Evidently girls with poor grades are more reluctant to enroll in chemistry or physics than are boys with poor grades.

Table 30 lists the differences between boys and girls in Theoretic and Immediate interests. These differences are essentially similar to those found in the pilot study.

In the pilot study, it was demonstrated that a strongly Theoretic orientation as opposed to an Immediate orientation enabled the boys to achieve a high grade in mathematics and science but that it made no difference to the girls. This relationship, Table 31, is not as clear cut for the large group. In chemistry and physics, the Immediate boys have roughly half as much chance of receiving a high grade as the Theoretic

TABLE XVIII

ASSOCIATION BETWEEN PSYCHOMETRIC SCALE SCORES AND OCCUPATIONAL ASPIRATIONS

A. Percentage of Students at Each Scale Score Aspiring to Enter "Social Service" Occupations: e.g., social welfare, ministry, education, medicine, law, journalism, nursing, and kindred occupations													
Scale Scores	1	2	3	4	5	6	7	8	9	10	11	12	13
	School Number												
													All Schools Combined
3	100%	87%	95%	90%	100%	91%	80%	84%	95%	--	83%	100%	82%
2	87	62	72	60	86	72	64	68	75	100	70	72	76
1	39	22	39	53	30	31	35	21	29	67	65	30	37
0	31	6	15	6	0	0	12	16	5	33	41	25	14
													67%
													72
													39
													16
B. Percentage of Students at Each Scale Score Aspiring to Occupations in Engineering, Mathematics, or the Physical Sciences													
Scale Scores	1	2	3	4	5	6	7	8	9	10	11	12	13
3	0%	13%	5%	10%	0%	9%	12%	16%	5%	--	17%	0%	18%
2	13	30	20	40	14	20	36	32	25	0	30	20	24
1	61	70	61	47	62	69	65	79	71	33	35	62	63
0	69	94	85	94	100	100	88	84	95	67	59	75	86

TABLE XIII

SEX DIFFERENCES IN INFLUENCE OF GRADES UPON ENROLLMENT
IN CHEMISTRY, PHYSICS, OR BOTH.

A. Enrollment by Sex

	Boys	Girls
Enrolled	405	285
Not Enrolled	60	72
Number of Cases	1287	1191

B. Influence of Grades Upon Enrollment

	Median Academic Grade				
	A	B	C	D	F
Enrolled	815	585	275	75	25
Not Enrolled	19	42	73	93	98
Number of Cases	160	638	1093	543	44

C. Ratio of Boys to Girls at Each Grade Level by Enrollment

	Median Academic Grade				
	A	B	C	D	F
Enrolled	.69	1.16	2.96	4.00	
Not Enrolled	.30	.22	.77	2.00	2.16

TABLE III
DIFFERENCES BETWEEN BOYS AND GIRLS IN
THEORETIC VS. IMMEDIATE INTERESTS

Scale Scores	Description of Interest	Boys	Girls
3	Highly Theoretic	175	85
2	Moderately Theoretic	46	36
1	Moderately Immediate	29	42
0	Highly Immediate	8	14
Number of Cases		1906	1764

TABLE XIII

PERCENTAGES ATTAINING "A" AND "B" GRADES AT EACH SCORE OF THE THEORETIC-IMMEDIATE SCALE

IN SUBJECT AREA AND SEX

Subject Area	Boys					Girls				
	Theoretic		Immediate			Theoretic		Immediate		
	3	2	1	0		3	2	1	0	
Social Studies & English	39%	30%	19%	26%		55%	47%	46%	44%	
Algebra, Geometry, & Trigonometry	44	35	22	24		49	36	30	25	
General Science, Biology, etc.	46	36	23	22		50	39	37	35	
Chemistry & Physics	57	46	33	20		55	42	42	44	
Median Academic Grade	38	29	16	22		53	42	40	38	

boys. For the girls, the effect is in the same direction, though not as great. A similar variation is seen in general science and biology. In mathematics, a Theoretic orientation seems to be equally advantageous for both boys and girls. This variation, also, calls for additional study.

Table 32 compares Prudent-Theoretic scores with the specialization of achievement. These data from a total number of 1527 students provide a faithful replication of a similar finding with the pilot group. Among the 237 who are most strongly Prudent, one-third is better in science, but two-thirds do better in social studies and English. Among the 212 who are strongly Theoretic, one-third do better in social studies and English but two-thirds do better in science.

SUMMARY

This report of an investigation into the attitudes of high school students is made to the United States Office of Education, the major source of financial support. It begins with a brief description of the theoretical background, a description which will be found much more completely in an article by Edwards and Wilson published in Educational Theory. Copies of this article have already been forwarded to the Office of Education.

There are 32 tables of information in this report all of which summarize data obtained from a sample of 3750 high school students. Sampling procedures are indicated and the sample is described. The contents of the tables are explained and discussed.

In general, the tentative conclusions of the pilot study have been replicated. These, and some additional information are included in the following list:

1. Subjects were given a 5-point scale to rate the extent to which they agreed with the statement: "I am more interested in the practical application of knowledge than in the study of knowledge for its own sake." The scale was as follows: 5 = Strongly agree, 4 = Agree, 3 = Neither agree nor disagree, 2 = Disagree, 1 = Strongly disagree.

2. Subjects were given a 5-point scale to rate the extent to which they agreed with the statement: "I am more interested in the study of knowledge for its own sake than in the practical application of knowledge." The scale was as follows: 5 = Strongly agree, 4 = Agree, 3 = Neither agree nor disagree, 2 = Disagree, 1 = Strongly disagree.

TABLE XXII
INFLUENCE OF PRACTICE VS. THEORETIC INTERESTS ON THE
SPECIALIZATION OF ACHIEVEMENT

Area of Relative Academic Superiority	Practical		Theoretic	
	3	2	1	0
General Science, Biology, etc.	35%	37%	50%	66%
Social Studies & English	65	63	42	34
Number of Cases	237	685	393	212

3. The study was designed to determine the relationship between the degree of interest in the practical application of knowledge and the degree of interest in the study of knowledge for its own sake. The results of the study are presented in Table XXII. The table shows that the degree of interest in the practical application of knowledge is positively related to the degree of interest in the study of knowledge for its own sake. The correlation coefficient is .42, which is significant at the .01 level.

4. In the study, the degree of interest in the practical application of knowledge was measured by the degree of agreement with the statement: "I am more interested in the practical application of knowledge than in the study of knowledge for its own sake." The degree of interest in the study of knowledge for its own sake was measured by the degree of agreement with the statement: "I am more interested in the study of knowledge for its own sake than in the practical application of knowledge."

5. The study was designed to determine the relationship between the degree of interest in the practical application of knowledge and the degree of interest in the study of knowledge for its own sake. The results of the study are presented in Table XXII. The table shows that the degree of interest in the practical application of knowledge is positively related to the degree of interest in the study of knowledge for its own sake. The correlation coefficient is .42, which is significant at the .01 level.

6. In the study, the degree of interest in the practical application of knowledge was measured by the degree of agreement with the statement: "I am more interested in the practical application of knowledge than in the study of knowledge for its own sake." The degree of interest in the study of knowledge for its own sake was measured by the degree of agreement with the statement: "I am more interested in the study of knowledge for its own sake than in the practical application of knowledge."

1. Reliable scales with C of R varying from .87 to .94 for use with high school students are available to distinguish orientations of attitudes toward the study of school subjects along six continua. These continua contrast dispositions favorable to:
 - a. Deliberation prior to decision-making with respect to the social environment.
 - b. Deliberation prior to decision-making with respect to the non-social environment.
 - c. An immediate relationship to the social environment characterized by valuation of esteem and sanctions of others.
 - d. An affective immediate relationship with the natural and physical environment.

For convenience, names have been assigned to each of these four poles:

Prudent, Theoretic, Immediate, Aesthetic.

2. Girls receive better grades than boys.
3. When comparisons are made between sex and scores on the Prudent-Theoretic scale:
 - a. More girls are highly Prudent than boys (67%-33%).
 - b. More boys are highly Theoretic than girls (84%-16%).
4. With the findings from all schools combined, more students who are strongly Prudent receive A or B grades than those who are strongly Theoretic. This conclusion substantiates an important discovery made in the treatment of data from the pilot study. Variations were observed among data from different schools. These variations may make possible the detection of differences in curricular expectations.
 - a. In the findings from 4 of the 13 schools, the relationship is linear between Prudent-Theoretic scale scores and achievement of median academic grades of A and B.
 - b. In the findings from 6 schools, the relationship is curvilinear, although in all six a higher percentage of students with a strongly Prudent orientation receive high grades than among those highly Theoretic.
 - c. In 2 of the 13 schools the relationship is linear but in the reverse direction. (A larger percentage of Theoretic students receive A and B grades.)

- d. In one school, the relationship is both reserved and curvilinear.
- e. Among boys from all schools who are enrolled in chemistry and/or physics 61 per cent of those who are strongly Prudent receive A or B grades, whereas 53 per cent of those who are strongly Theoretic receive A or B grades.
- f. Among girls from all schools who are enrolled in chemistry and/or physics 84 per cent of those who are strongly Prudent receive A or B grades, whereas 65 per cent of those who are strongly Theoretic receive A or B grades.
- g. Advantages deriving from Prudent or Theoretic interests vary according to the subject being studied.
 - i. Prudent interests when contrasted with Theoretic interests are advantageous to both boys and girls in achieving high grades in social studies and English, and to girls when grades in all subjects are averaged.
 - ii. Theoretic interests are advantageous to both boys and girls in achieving high grades in mathematics, to boys and girls in general science and biology, to girls in chemistry and physics, and a slight advantage to boys when all grades are averaged.
 - iii. Either strong Theoretic interests or strong Prudent interests are equally helpful to boys in achieving high grades in chemistry and physics or to girls in doing the same in general science and biology.
5. Prudent-Theoretic interests have been compared with vocational aspirations.
 - a. Those who are Prudent aspire to social service occupations.
 - b. Those who are Theoretic aspire to occupations in science and mathematics.
6. Girls who receive a low grade are less likely to enroll in chemistry and/or physics than are boys who receive a low grade.
7. Students with high median academic grades are more likely to enroll in chemistry and/or physics than students with lower academic grades. (81% of the A's, 58% of the B's, 27% of the C's).
8. When Theoretic and Immediate interests are contrasted it is found that twice as many boys as girls are highly Theoretic. Conversely, twice as many girls as boys are highly Immediate.

9. Theoretic interests when contrasted with Immediate interests help both boys and girls to achieve higher grades, but such interests are most helpful to the boys, and most helpful to the boys in the study of chemistry and physics. Theoretic interests are most helpful to girls in the study of mathematics.
10. Effects of Prudent-Theoretic interests on the grades of the same person have been contrasted in different subjects.
 - a. Those who are Prudent receive better grades in social studies and English than they themselves do in science and mathematics.
 - b. Conversely, those who are Theoretic receive their best grades in mathematics and science.

Data have been collected and processed on a large number of variables whose interrelationships have yet to be investigated. This fund of information may provide an explanation for the curvilinear relationship found in many schools between Prudent vs. Theoretic interests and grades; and will most certainly provide the raw material for several additional studies. Copies of future publications based on these data will be forwarded to the Office of Education when they are ready.

POSTSCRIPTUM

The progress reported has resulted from the whole-hearted cooperation of a number of workers. First, I should like to use this opportunity to express my deep feeling of gratitude toward Mr. Alan B. Wilson who has been Associate Director of the project. Many of the ideas, much of the enthusiasm, and the bulk of the backbreaking work were his. His passion for accuracy was both a goad and a solace.

We are both deeply indebted for assistance from time to time from Mr. Robert Wenkert, Miss Demitra Georgas, Mrs. Dorothy Seiden, and Mr. Stewart Klitsner. In the final days of almost endless sorting and counting and coding, they met the challenge of 3750 documents.

Mrs. Gertrude Funkhouser, secretary of the division of Secondary Education, has been most helpful--as much perhaps by her understanding and encouragement as by her hours and hours of typing. Miss Doris Marks guided us to a safe path through the difficulties of administration.

All of us are most grateful to the University of California and to the United States Office of Education for the river of funds and resources coming our way from these two great contributories.

T. B. E.